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ORIGINAL ARTICLES.

PAPILLOID GROWTH ON THE BULBAR CONJUNCTIVA.

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PATIENT, Lillie P., a colored girl, of 10 years, presented herself at my clinic on February 3, 1897, on account of a red spot on the white of the left eye which, she stated, she had noticed for the first time about last Christmas. It was as large then, she thinks, as it is now. There is no history of trauma or inflammation of any kind, nor does the eye pain or inconvenience her in any way. Fig. 1 shows the position and appearance of the spot. It is roughly circular in shape, and measures about 1 cm. in its largest diameter. Two large conjunctival vessels enter its upper border and form a loop near its center and from this there radiate in a beautiful and symmetrical manner a large number of delicate vessels ending in loops at the edge or sometimes in a series of loops running back towards the center. The whole is easily movable with the conjunctiva over the sclera. The tissue between the vessels is slightly more opaque than the surrounding conjunctiva. There was no sharply defined edge and it was at first thought to be simply a formation of new vessels in the conjunctival tis-

sue probably from a blood-clot. In manipulating it, however, with a probe, it was found that it could be raised from the conjunctiva beneath, save at its attachment by a pedicle 2 mm. thick, where the large vessels entered it. As the smaller of these vessels, *a*, Fig. 1 filled from above, and the larger, *v*, filled below, when emptied by pressure, it was inferred that they were arteries and veins respectively. The growth is about 1.5 mm. thick at the center, gradually thinning off to a knife-like edge. It did not bleed on handling, and its surface is perfectly smooth.

FIG. 1.

It was watched for three weeks during which time there was no material change in its size. There were, however, some changes in its vascularization, some of the small vessels disappearing and new ones forming. The growth was clipped off close to its attachment to the conjunctiva and placed in 5 per cent. solution of formalin. There was an insigficant amount of bleeding.

Sections were made after proper preparation by Dr. Wallace Johnson at the Lionel Laboratory of the Emergency Hospital.

The histological structure is shown in Fig. 2. It is composed almost entirely of epithelial cells and blood-vessels, the connective tissue element being the scantiest possible. There is a pronounced tendency towards a definite arrangement of these cells, being squamous on the surface and passing gradually over to the columnar form at the center particularly where they join the connective tissue of the pedicle, *d*, Fig. 2.

From its histological structure the tumor falls more nearly in the category of papilloma than any other of the polypoid forms of neoplasm.

Granulation tumors are nearly always the results of traumatism or other destructive inflammation of the conjunctival tissue, and are composed largely of lymphoid cells.

True polypi, while having an epithelial covering, are constituted mainly of connective tissue, blood-vessels and lymphoid cells. Both these bleed easily on handling.

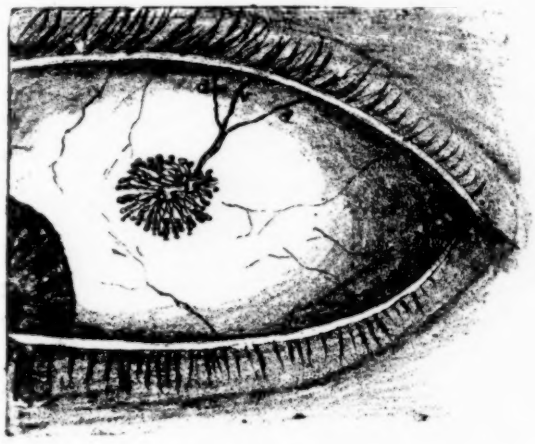

FIG. 2.

In papilloma, however, the epithelial element is predominant, and usually in the form of enlarged papillæ with a vessel running through the center of each and is commonly composed of a number of these massed together, of which the cauliflower condyloma is a typical example.

In the one now described there was no such division into separate papillæ, but it is perhaps not a far-fetched fancy to consider it as one in the process of formation and that these radiating vessels were the centers around some of which a single papilla would in time develope.

Growths similar in structure to this one have been found on the conjunctiva by Hirschberg,[1] Magnus,[2] Weeks[3] and some

[1]Centralbl. f. Augenheilk, 1884.

[2]Klin. Monatsbl. f. Augh , 1887

[3]New York Eye and Ear Infirmary Reports, January, 1896.

others, but they are rare and usually are situated on or near the curuncle. In some cases a suspicion of syphilis was present, and there were a number of the tumors scattered over the conjunctiva of the lids and ball. In some instances there has been a tendency to recur after removal.

ETHMOIDAL DISEASE. — ITS OPHTHALMOLOGICAL SYMPTOMS.[1]

BY THOS. R. POOLEY, M.D., NEW YORK.

THE purpose of this paper is to portray the symptoms of the diseases of the ethmoidal cells which present themselves to the ophthalmologist, and to briefly consider the proper treatment therefor.

For a better comprehension of the subject, it will be well to give an outline of the anatomy of the inner walls of the orbit, and of their relation to the ethmoid cells and other accessory sinuses.

The inner wall of the orbit is vertical, joins the roof above at almost a right angle, while below, it passes, by a gradual curve, into the floor.

It is made chiefly by the orbital plate of the ethmoid, os planum, a small part of the sphenoid is behind this. In front of it is the lachrymal bone, which consists of two parts. The hind one is in the same plane as the ethmoid. The front one, separated from the other by a ridge, forms a part of the lachrymal groove, which is completed by the ascending process of the superior maxillary.

The anterior and posterior ethmoidal foramina are between the ethmoid and the frontal, and open on the inner wall of the orbit. Almost the whole of this wall is of extreme thinness; and quite unable to resist pressure as of a tumor, from either within or without.

Anteriorily, the frontal sinus descends into it. Below and behind this, the wall separates the orbit from the nasal cavities.

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[1]Read before the Section of Ophthalmology of the Academy of Medicine, March 16, 1897.

Occasionally, the ethmoidal plate bulges into the orbit. Probably this, if marked, is pathological.

The floor slopes more or less downward and outward. It is made by the superior maxilla, excepting a small triangular piece near the apex made by the palatal, and its outer anterior angle, made by the malar.

The spheno-maxillary fissure opening into the zygomatic fossa bounds the floor externally in the posterior two-thirds of its extent. From this fissure the infra-orbital groove runs to within 1 or $1^1/_2$ cm. of the anterior wall, when it becomes a canal passing under the infra-orbital ridge. Very often, its course is marked by a suture in the floor.

From the inferior part of each lateral mass of the ethmoidal cells, just beneath the os planum projects the unciform process. It serves to close in the upper part of the orifice of antrum, and articulates with the ethmoidal process of the inferior turbinated bone.

The posterior ethmoidal cells open into the superior meatus of the nose, just beneath and in front of the superior turbinated bone, by means of an orifice at the upper part of this fissure.

It is by a large orifice at the upper and front part of the middle meatus that the anterior ethmoidol cells, and through them the frontal sinuses, communicate with the nose, by means of a funnel-shaped canal, the infundibulum.

It will be thus seen that the cellular cavities of each lateral mass thus walled in by the os planum on the outer side, and by the other bones already mentioned, are divided into two sets, which do not communicate with each other. They are termed the anterior and posterior ethmoidal cells or sinuses.

The former, more numerous, communicate with the frontal sinuses above, and the middle nasal meatus below by means of a long flexuous canal, the infundibulum and occasionally by an opening in the median side of the bulba ethmoidalis. The posterior, less numerous, open in the superior nasal meatus, and communicate (occasionally) with the sphenoid.

Diseases of the ethmoidal and sphenoidal sinuses are the most unusual of those affecting the accessory sinuses, according to Fuchs among the greatest rarities, and besides, are, for the most part, not possible to diagnosticate in the living. To

both of these statements we may take exception. The diseases are not so exceedingly rare, and they can be diagnosticated with reasonable certainty during life.

The dilation of these cavities takes place through a bulging out of the walls. Moreover, the wall of these cavities which looks toward the orbit is bulged outwards so that exophthalmos with a coincident lateral displacement of the eyeball toward the side opposite to that of the ectasis occurs.

The most frequent cause of such distension of these cavities is in the accumulation of secretions in them. They are accessory cavities of the nose and are lined by extension of the nasal mucous membrane.

Catarrhal inflammation of the nasal mucous membrane is frequently communicated to them, and, if the passage, narrow as it frequently is, between the accessory sinus and the nose is blocked by swelling of the mucous membrane, secretion is accumulated in the former.

As the mucous membrane of the accessory cavity does not stop secreting, it gradually becomes filled, and finally, distended with secretion.

This secretion may have a varying consistency, being of watery, glairy, sticky or purulent character. In other instances, the distension may be produced by tumors, such as polypi, osteomata or malignant new-growths.

Having thus briefly referred to the symptoms referable to all of the accessory sinuses, let us now enter more at length to the special subject of our paper. The commonest form of the disease of the ethmoidal cells is that caused by the retention of secretion in them, and which we prefer to call, after Knapp, retention cyst, the symptoms of which may be thus summarized: A tumor develops slowly, accompanied by but little pain or inconvenience in the upper inner angle of the orbit, which pushes in the inner wall; may slightly displace the eye downward and outward and is located above and behind the ligamentum canthi internum. Its entire surface is hard and somewhat nodular and the whole tumor immovable. Indeed the fact to be most remarked upon and emphasized is that by the symptoms alone afforded from the history, growth or palpation of the tumor, it is difficult if not impossible, to differentiate it from an exostosis. The exploration by incision alone will definitely decide this point. Or it may be arrived

at by penetrating the tumor with a trocar. This being done, we enter a cavity from which secretion escapes. The nature of this secretion is neither of a water nor purulent character, as is usually stated, but has a thicker consistency, is of a glairy, sticky and tenacious kind, resembling honey.

A remarkable case of this kind, with some unusual features, came under my notice recently. A healthy young girl, 12 years of age, consulted me at my clinic October 2, 1896, and she is present here this evening for you to see.

Situated in the upper inner region of the right orbit, reaching downward below the ligamentum canthi internum, was a reddened area of swollen indurated tissue, and, just above the ligamentum canthi, was a fistulous opening, from which a muco-purulent discharge escaped, and which, according to the patient and her mother's statements, had existed in that state for a considerable time.

It came first as a hard swelling, and, subsequently, the discharge occurred, but, at no time, was there any considerable pain or disturbance of the functions of the eye. The disfigurement from constant discharge caused her to seek relief. At first, I did not connect the difficulty with the ethmoidal cells, but took it to be an abscess with fistulous opening, and tried to close it by cauterization, which proved unsuccessful. I then (December 15, 1896), etherized the patient, slit the sinus open, turned out a mass of granulation tissue, and packed it with iodoform gauze. After a few days of this treatment, a point could be seen by illumination with a laryngoscopic mirror just above the ligamentum canthi internum from which the discharge seemed to come. A strong lachrymal probe placed at this point pierced the bone and entered into a cavity from which a quantity of stringy muco-purulent matter escaped. On more careful examination, this proved to be an irregular, but uninterrupted bony cavity, containing mucus of a stringy character. The bone was farther broken down with the probe, the cavity washed out with carbolized warm water, but none of the fluid seemed to find its way into the nose. Dr. Myles made an examination of the nose, but found only a slight swelling of the middle turbinated bone. The function of the nostril did not seem impaired, nor was the voice affected. I now inserted a small, soft, silver style, perforated along its sides, which was removed daily and the cavity syringed out with

carbolized water. The discharge gradually became less, of a more mucous character. That granulation from the bottom was taking place became evident from the tendency of the tube to be extruded. In three weeks I removed the style, and in one week more the wound had firmly closed and there has been no relapse.[2] For some time, the tissues remained hard and swollen, but this, as you will see, has disappeared. I showed the patient to the Section while she was wearing the tube.

The feature of unusual interest in this very interesting case is, that instead of the bony tumor at the usual site, there was a fistula, caused by the spontaneous opening of the tumor in its least resistant part; but, on account of the imperfect emptying of the cyst, did not cause a cure. It was, therefore, necessary to come to the aid of Nature. The short time required for the cure is of interest. In one case reported by Knapp, it took one year to close the cavity, during all of which time the patient wore a style. I do not think that a large opening into, or removal of, all of the bony wall which protrudes into the orbit, recommended by Knapp, is either necessary or desirable, although it may not, in any way, interfere with the preservation of the eyeball. An opening sufficiently large to admit of free drainage—perhaps this might be better accomplished by making communication with the nose, cleansing of the cavity by aseptic solutions, and, if this does not arrest the morbid secretion, injection of irritants is all that is needed. This is shown in the short time required to cure the case reported. More destruction by chiselling away the bony wall would, of necessity, have made the healing more protracted, and might result, too, in a sinking in of the inner orbital wall. In some of these cases, besides the contents spoken of, we find granulations, or polypoid growths filling the cells, which must be removed by a sharp spoon.

Exostosis may develop from the ethmoidal cells, as well from the frontal sinus, and, from thence, protrude into the orbit, or they may have prolongations from both of these cavities.

I show here, this evening, such a growth which I successfully removed, with preservation of the eye, February 8, 1890,

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[2]Since this was written there is a slight relapse in the way of a small opening from which some muco-pus exudes.

which probably had its origin in the ethmoidal cells. This, while stated at the time of publication (*Medical Record*, October 11, 1890), was rendered still more so by the subsequent discharge through the nose of a sequestrum (which is, too, shown), after a violent attack of sneezing.

These growths show themselves as ivory, hard immovable tumors in the upper inner angle displacing the eye, impairing its movements, producing exophthalmos, attacks of cerebral irritation and optic neuritis.

It will be, as a matter of fact, often difficult to be sure before the facts are brought to light by the operation for their removal, whether they have their origin in the ethmoid or frontal sinus. These growths are rare. My experience embraces two cases. Both operated on. One died, the other recovered. They should be operated on, if the symptoms are formidable enough to warrant it, by detaching them from their basis with a chisel, or, better still, by enucleation, which means detaching them from the periosteum which covers them, and prying them out of the cavity from which they grow.

Time does not permit me to go into the details of the operation. Successful cases have been published by Knapp, Andrews, Reeves, myself and others; and Andrews has entered very fully into the literature of the subject in a most admirable paper in the *Medical Record* of September 3, 1887.

I may mention, in conclusion, that other growths than osteomata may start from the cavity of the ethmoidal cells and protrude into the orbit. Their anatomical structures being very various. Among them have been classified fibrous, myxomatous, polypoid (although, as has been pointed out already, polypi, in the present writer's opinion, are the outcome of granulation tissue, resulting from retention cysts), sarcomatous, cartilaginous, osseous (already mentioned), adenoid and carcinomatous tumors.

The maxillary antrum, however, is more frequently invaded by such growths than any other of the accessory sinuses. It is, perhaps, unnecessary to point out the indications that such growths have developed from the ethmoidal sinus. It is to be inferred from what has gone before. The promnence of the globe, displacement thereof in a direction away from the growth, cerebral irritation, perhaps optic neuritis co-

incident with the finding of a growth in the upper wall of the orbit.

It must be borne in mind that the tumor, although developing in the nose or maxillary antrum, may, from thence, invade the ethmoid cells, by destroying in its growth the inner and lower walls of the orbit.

In concluding these desultory remarks I may say that no attempt has been made to enter into the consideration of the diagnosis of diseases of these cells, especially of those of retention cysts, by the examination of the nose and post-pharynx, which is a subject of much interest, and there are those present whose knowledge in this particular would make any remarks they might offer of more interest than anything I could say.

A NEW LAMP FOR SKIASCOPY.

BY B. E. FRYER, M.D., KANSAS CITY, MO.

THE skiascopic test for refractive errors is growing in favor; in fact, probably a majority of the most careful oculists apply it as a routine matter in their refractive work. As is well known, by this method we can very quickly and easily arrive at the exact refraction of an eye, which other measures may not give as readily or as correctly.

As Dr. Edward Jackson has shown in his thorough monograph on "Skiascopy," it is of that great advantage in the practice of the method, to have a light which can be "pushed off" from, or brought near to, the observer. This, of course, is mainly important when using the plane mirror, which latter, under most conditions, is the more generally useful and satisfactory.

I have had a lamp constructed which I find very convenient for the purpose, and the two accompanying figures are an illustration of it. Fig. 1 gives a side view, and Fig. 2 a birds'-eye view. The letters in each figure correspond.

A is a vertical rod, three feet long, attached to the wall of the room by a cross-piece above and below arranged however far enough from the wall so that the whole apparatus can be raised or lowered to any height desired, and clamped and fastened by a thumb-screw as indicated at A in Fig. 2. There is

a joint at B, which allows of the lamp being moved laterally, and one at C, which also allows of lateral movement. At A, the lamp proper is shown in position, held by a cross-piece connecting a pair of rings or rather short tubes which allow

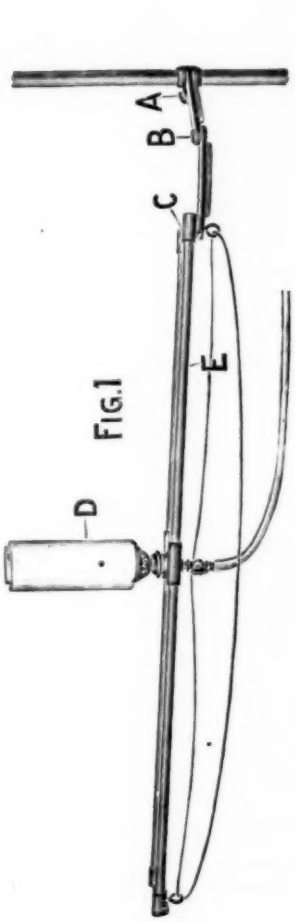

FIG. 1

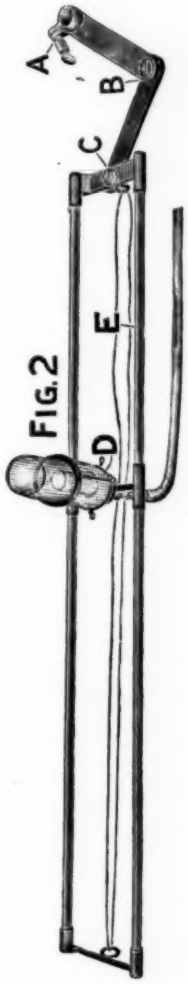

FIG. 2

the lamp proper to slide, when desired, smoothly over the long bars which form the long sides of the parallelogram (Fig. 2). The long diameter of this parallelogram is a little over one metre. Attached to the short sides, but below them, is a ring through which a cord, E, plays for the purpose of draw-

ing the burner towards, or pulling it away, from the observer's eye. A rubber tubing connects the burner with a gas pipe near. The light I use is furnished with a Wellsbach burner, and in Fig. 1 this is shown with an asbestos hood, in which latter is a small perforation. Of course, the ordinary Argand burner can be used instead of the Wellsbach. The whole lamp can be swung back against the wall out of the way when not in use.

It will be found that the observer, in making a test, can, without removing the mirror from his eye, change the distance between him and the light very conveniently and readily, and that in doing so the light moves practically along as a right line. With the plane mirror, by "pushing off" the light its full distance (one metre), the observer being at one metre from the observed eye, has practically the immediate source of light at two metres, and can thus do away with the observer moving from the patient that distance; or can readily have the burner at any point along its range.

The lamp can be obtained from Mr. G. B. Lichtenberg, 1210 Main Street, Kansas City.

ACUTE GLAUCOMA ASSOCIATED WITH LARGE NASAL POLYPUS. REMOVAL OF THE POLYPUS AND RELIEF OF THE GLAUCOMATOUS SYMPTOMS.

BY S. C. ARYES, M.D., CINCINNATI, OHIO.

PATIENT, Mr. M., aged 55, in fairly good health, applied for advice in relation to the vision of his right eye, which had recently become quite dim. There had been attacks of dimness recently but they had subsided, but as these attacks had become more frequent he became alarmed. He had always enjoyed excellent vision and was wearing the ordinary convex glasses suited to his age. Vision in the right eye was 0.2. The pupil was moderately dilated but responded sluggishly to light. Tension was + 1 ?; tension of the left eye was normal. The ophthalmoscope revealed no cupping. The nasal twang about his voice induced me to examine his nose

and I found in the right side a very large and solid mucous polypus which quite filled its lumen. It was quite impossible for him to breathe through this side. He said this state of affairs had existed for a long time, but as he could breathe through the other side he had paid little or no attention to it.

Eserine was ordered for the right eye and the next day, February 24, 1891, vision was reduced to 0.1. Tension same as yesterday. February 26, eserine has been used for the past two days and V.=0.3. There is no turbidity of the media. Removal of the nasal polypus was urged on the grounds that it was necessary for healthy respiration and that there might be some indirect connection between the glaucoma and the pressure in the nasal cavity. This was done at once and the next day the eye was decidedly improved. Vision was 0.7, and tension was normal. February 28, V.=0.8. The glaucomatous symptoms seemed to disappear as soon as the polypus was removed and his eye promptly regained normal vision.

Two or three years later he was a client of mine for conjunctivitis, but there was no return of the increased tension or of the spells of dimness which he had prior to the operation. Was this a reflex irritation?

A CASE OF SCIRRHOTIC CARCINOMA OF THE ORBITAL LACHRYMAL GLAND.[1]

BY J. ELLIS JENNINGS, M.D., ST. LOUIS, MO.

WITH MICROSCOPICAL EXAMINATION.

BY ADOLF ALT, M.D., ST. LOUIS, MO.

PATIENT, Mrs. C., aged 45 years, came to the Mullanphy Hospital February 1, 1897, on account of the prominence and displacement of her right eye. She was first seen by Dr. N. B. Carson at the Surgical Clinic, but the following

[1]Read at the Second Annual Meeting of the Western Ophthalmological, Otological, Laryngological and Rhinological Association, held in St. Louis, April 8–9, 1897.

day appeared at the Eye Clinic and came under the care of Dr. S. Pollak and myself.

The patient is a large, healthy-looking woman weighing 180 pounds. Family history negative. Her father and mother died in the old country, cause of death unknown. One sister died in 1893 from kidney disease. Has one grown daughter in good health.

FIG. 1.

Patient states that she first noticed that the right eye was more prominent than the left in 1885, about twelve years ago. This proptosis increased very slowly and never caused her any pain or inconvenience other than cosmetically. In 1887, she applied to the Missouri Medical Eye Clinic for treatment, but as they advised an operation she did not go back.

October 29, 1893, she again sought advice, this time at the Beaumont Hospital Eye Clinic, where she was seen by Dr. Alt. From the notes of the case, taken at that time, a large intra-orbital tumor was found apparently springing from the roof of the orbit. A diagnosis of osteo-chondroma (?) was made and an operation advised, but as she was suffering no pain, this was refused.

Early in August, 1896, the patient noticed that the bulging of the eye was rapidly increasing, and for the first time began to suffer from a burning pain in the eye with severe

headache and neuralgia confined to the right side of the head. After suffering in this way for six months she decided to have an operation performed.

PRESENT CONDITION.—The drawing gives an accurate idea of the condition. The right eye is seen to be pushed very far forwards and somewhat downwards. When the eye is kept open naturally the upper lid is 2 or 3 mm. behind the upper margin of the cornea. As the eye is sensitive to light, the patient keeps the eye partially covered by drawing down the upper lid with her fingers. The palpebral and ocular conjunctiva are hyperæmic. The ocular movements are good. The pupils are equal in size and active to light. Above the eyeball a hard tumor is felt apparently occupying the upper portion of the orbital cavity and extending outward over the orbital margin. V., O. D. $^{2}/_{LX}$; O. S. $^{5}/_{V}$.

The optic disc of the right eye is of a dull gray color and is surrounded by a very large patch of choroidal atrophy with pigment changes in the macula region. The veins and arteries are quite small.

The tumor was removed by Dr. Carson February 4. An incision 5 c.m. in length was made over the upper orbital margin and the tumor in its capsule was easily dissected loose. The only point of attachment was at the outer edge of the orbit. The wound was closed with buried gut sutures, an antiseptic dressing applied and the eye bandaged for one week. When the dressing was removed the wound had healed and the eyeball occupied its normal position in the orbit.

The patient has kindly consented to be present this evening and if you examine her you will notice that there is now—one month after the operation—considerable ptosis and proptosis. The ptosis is gradually becoming less marked and may disappear in from six months to a year. The return of the proptosis at so short a time after the operation must be due to cicatricial contraction and not, I take it, as an indication of a recurrence of the growth. The special point of interest in this case, *i. e.*, the slow growth of the tumor, is explained by the scirrhus nature of the carcinoma.

MICROSCOPICAL EXAMINATION OF THE ORBITAL TUMOR.

The tumor when handed to me for examination was a little more than one and one-half inches long and one inch thick,

of an ovoid shape and apparently surrounded by a dense capsule.

It consisted histologically in the main of connective tissue and epithelial cylinders. In some parts the latter prevailed, while in other large areas a dense connective tissue only was found. In the tumor proper no blood-vessels could be detected.

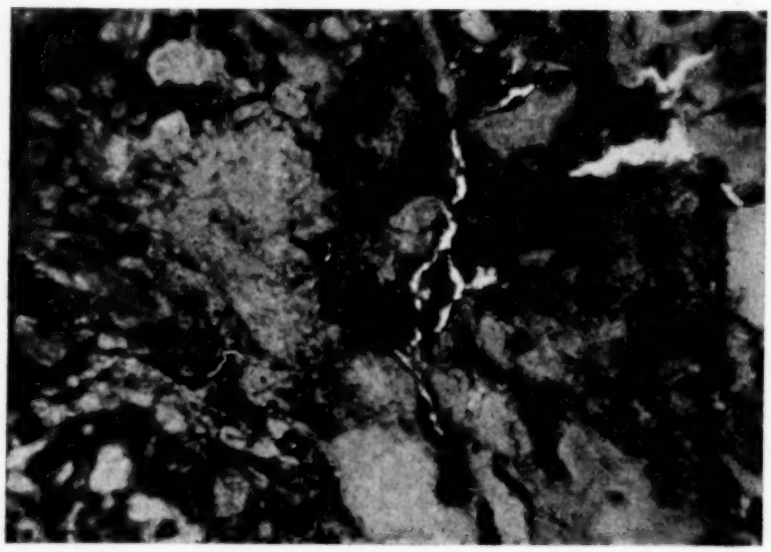

FIG. 2.

The epithelial cylinders were arranged as we are accustomed to find them in carcinomatous tumors. They consisted of cells with a peculiarly large oval nucleus. They were evidently dropsical and undergoing a regressive metamorphosis in places, while in others karyokinetic figures and in some two and three nuclei showed further new-growth of cells.

As, when seeing the case three years ago, I had found an enormously large intra-orbital tumor apparently springing from the roof of the orbit and causing a straight-forward exophthalmus, which was immovable and therefore led me to the diagnosis of an osteo-chondroma, I was particularly desirous to find the starting point of the tumor. I think I found it in the lachrymal gland.

To one end of the tumor portions of a glandular organ were firmly adhering, which I am satisfied from their structure, were remnants of the lachrymal gland.

The connective septa had disappeared and the acinous arrangement was hardly recognizable, but the cell cylinders still showed a regular arrangement. From this more solid epithelial structure the epithelial cell cylinders were seen to break through a connective tissue capsule, evidently the capsule of the lachrymal gland, and to spread out into the tumor.

In what I consider to be the remnant of the lachrymal gland a peculiar appearance was caused by the presence of innumerable granules lying between and within the epithelial cells and which from their shape are evidently the nuclei of leucocytes undergoing disintegration. Perhaps this is a sample of what Mentschnikoff described as phagocytosis and we have to look upon these leucocytes which are partly eaten up by the epithelial cells, as the vanquished army which for a long time has kept the enemy from advancing.

Another cause for the slow growth of the tumor, though undeniably a carcinoma, lies in the considerable connective tissue formation.

I consider the tumor to be a scirrhotic carcinoma starting from the lachrymal gland.

DISCUSSION.

DR. ALT.—The most interesting point in this case is the long period of duration of this growth—twelve years. This is the case of which I showed some photographs on the screen last night. I think the scirrhotic character of the growth is the explanation of its slow development.

RIGHT OF BLIND PERSON TO TRAVEL ALONE.—A question on which there seems to be a scarcity of decisions is whether a person otherwise qualified may be rejected as a passenger for the sole reason that he is blind. It was litigated in the case of Zackery vs. Mobile and Ohio R. R. Co., where the Supreme Court of Mississippi decided, February 1, 1897, in the blind man's favor, the one in question being admittedly not infirm, but robust, able to take care of himself, and to comply with the rules applying to passengers generally.—*Journal of the American Medical Association.*

HÆMORRHAGIC GLAUCOMA.[1]

BY ADOLF ALT, M.D., ST. LOUIS, MO.

ON SEPTEMBER 11, 1895, Mrs. G., aged 64 years, consulted me with the statement, that three weeks previously she had noticed that vision in her right eye became dim. This dimness had since gradually increased and that eye was practically blind.

The patient was a frail, badly-nourished woman, but considered herself otherwise perfectly healthy.

I found vision in the affected eye reduced to bare perception of light, in the left eye $^{20}/_{cc}$; 3 D. of hypermetropia. The anterior chamber was very shallow, the media were clear

In the right eye the macular region was the seat of a large retinal hæmorrhage, in which a number of whitish spots were visible. This hæmorrhage had comparatively regular outlines and was about twice as large as the papilla optica. Some smaller hæmorrhages lay between the macula and the optic papilla and on the other side of the latter and some small point-shaped hæmorrhages were situated farther out from the macula towards the ciliary region. The larger blood-vessels were only visible in parts; they appeared peculiarly dark and tortuous, the arteries without light-streaks and the veins were but slightly broader than the arteries. Tension was normal.

The pulse was normal, yet on examining the urine, I thought it contained a trace of albumen. Histologically, it contained nothing abnormal. I ordered milk diet and iodide of sodium. I also sent the patient at once to my friend, Dr. Baumgarten, of this city, whom I have long known as a very careful observer. His report, after repeated examinations, however, was that he could find nothing abnormal concerning the more important organs, neither did he find any albumen in the urine.

Under the treatment I had instituted her vision gradually became somewhat better until on October 4 it was $^{5}/_{cc}$. At

[1]Read and illustrated by lantern slides at the Second Annual Meeting of the Western Ophthalmological, Otological, Laryngological and Rhinological Association, held in St. Louis, April 8-9, 1897.

the same time the large hæmorrhage in the macular region underwent in parts a fatty degeneration and was partly absorbed.

On October 8 she came complaining of severe pain which had suddenly come on during the night. There were now a number of engorged episcleral veins. Tension was perhaps somewhat increased and there was a posterior synechia. Some new hæmorrhages had appeared in the retina and vision was again reduced to light perception. I ordered eserine and cocaine and prepared her for the evident coming on of glaucoma. A week after, on October 14, glaucoma was fully developed and eserine had no effect on its course. On October 16, the eye was totally blind, the lower half of the anterior chamber was filled with blood and no view of the fundus could be obtained. The pain meanwhile had become excruciating. The eyeball was now of a stony hardness and as miotics had no effect and I was satisfied that surgical interference would make matters only worse, I proposed enucleation. To this she consented on October 23.

This, then, was a typical case of retinal hæmorrhages inducing secondary glaucoma and it had run its course in about eight weeks, if the patient's statement can be considered as correct.

Her other eye has never shown any pathological symptoms up to this day.

The eyeball was hardened in formol solution. When I opened it a few days later, the vitreous was found to contain blood, especially in its outer portions and near the macula lutea. Contrary to the statements made, that in these cases the hæmorrhages are confined to the posterior pole of the eye, the retina to the very *ora serrata* was sprinkled with smaller and larger hæmorrhages of various shapes and sizes. The greatest effusion of blood, however, had evidently taken place in the macular region and between it and the optic papilla.

On histological examination I found the following: The cornea and Descemet's endothelium in general appeared unaltered. The periphery of Descemet's membrane was studded with glass warts. Schlemm's canal in all sections was closed, the compressed tissue of the ligamentum pectinatum filled with pigment molecules.

The periphery of the iris was closely attached to this tis-

sue and closely applied to Descemet's membrane farther forward. In the lower parts of the eyeball, where the blood had been, a delicate newly-formed membrane stretched from the insertion of the iris on Descemet's membrane over the anterior iris surface half way to the pupillary edge. This newly-formed tissue which I consider to be a direct consequence of the presence of blood in the anterior chamber, had in this case no time to lead to ectropium of the uvea, as we see in cases of longer standing.

The iris tissue throughout appeared atrophic, its blood-vessels were empty, their walls thickened. Where the sphincter edge touched the anterior lens capsule it was adherent to this.

The ciliary body and crystalline lens were pushed forward together with the iris. In consequence, the angle between the posterior surface of the iris-root and the apices of the ciliary processes was in most sections totally or almost totally obliterated and some ciliary processes lay in front of the periphery of the lens. The fibres of the zonule of Zinn were evidently stretched and ran forward in straight lines instead of being gently curved as in the norm.

The ciliary body was atrophic throughout. Its muscular tissue showed the arrangement of æquatorial fibres characteristic of short eyes. Its blood-vessels, where found, were gorged with blood, their walls frequently thickened.

The uveal and retinal cells of the ciliary body appeared considerably altered in a large number of sections, in that the cells appeared irregular and vesicle-like in shape and their nuclei did not stain well. In bleached sections it was seen that, as I have found in a number of glaucomatous eyes, both the pigment epithelium and the retinal layer cells were dropsical and appeared as large vesicle-like bodies.

The crystalline lens differed from the norm in so far only that its anterior surface was considerably more convex than its posterior one.

The anterior portion of the eyeball, thus showed all the histological symptoms which we are accustomed to look for in the present stage of our knowledge of the disease called glaucoma. To this I should add that the periphery of the retina was to a considerable extent altered and presented the condition which since Iwanoff is termed cystoid degenera-

tion of the retina, and which perhaps is, also, due to former hæmorrhages.

The posterior part of the eyeball was especially interesting on account of the hæmorrhages into the retina and the changes they had produced.

The optic nerve showed but a slight infiltration with round cells. The optic papilla was but slightly excavated and this excavation was a little deeper (Fig. 1) on the inner side of the papilla.

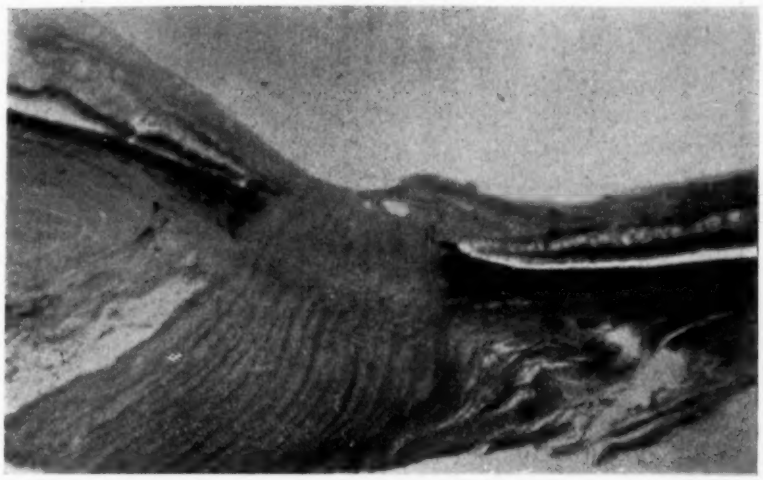

FIG. 1.

While hæmorrhages of quite recent and many of older date were found to occupy the nerve fibre, ganglionic, inner molecular and granular layers throughout the retina, the most conspicuous changes were found in the macular region and on both sides of the papilla. Here the most striking appearance was that the retina was considerably thicker than normal and was filled with innumerable cavities varying in size and shape. These cavities were partly empty, partly filled with finest fibrinous threads and few degenerated and fat granule cells, partly with blood cells alone. They were separated from each other by the supporting tissue of the retina pressed aside and together, so as to form more or less regular columns. These cavities reached from the nerve fibre layer outward to the

outer granular layer, the parallel outlines of which were in places deranged. What was left of the nerve fibre layer was almost all over gorged with blood (Fig. 2). In some places smaller, and in one place a considerable rupture of the retina had taken place. In the several sections I have of this latter, it is seen to have originated from two ruptures which finally united into one. One of these was on the inner surface and through it the blood entered directly into the vitreous body, the other was outward through the outer granular and the bacillary layer and produced a circumscribed hæmorrhagic detachment. The rods and cones were greatly changed in shape, in places wanting.

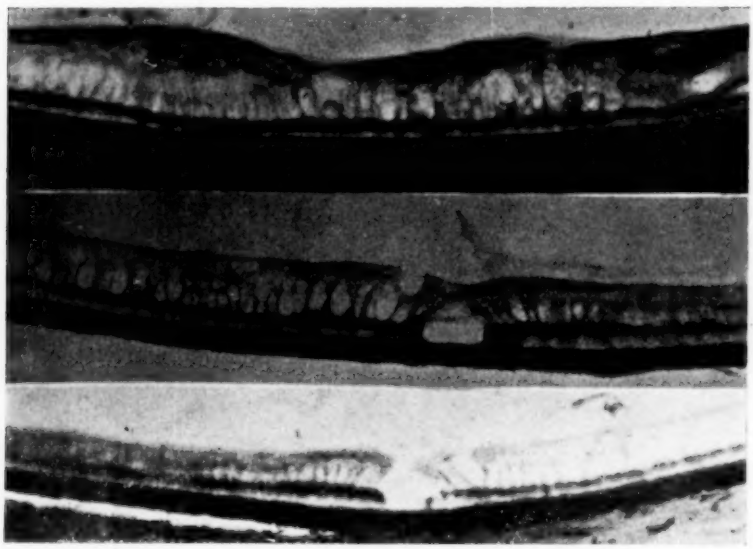

FIG. 2.

Our interest in such a case centers particularly around the blood-vessels of the retina. Wherever there was a larger hæmorrhage two pathological conditions were found, namely, thrombosis and thrombo-phlebitis of the larger venous blood-vessels and a very remarkable pigment degeneration of the walls of the smaller blood-vessels. Whole areas of the latter were changed into pigment granules which lay free in part and in part were inclosed in cells. In their neighborhood leucocytes abounded which had taken up the pigment granules (Fig. 3) and were carrying them away.

This pigment degeneration is a condition, I have never seen before, nor have I been able to find its description anywhere. It corresponds most with the pigment atrophy of muscular tissue. The arteries showed frequently, but not far progressed, an endo-arteritis.

The choroidal blood-vessels were hyperæmic, but the tissue of this membrane was not strikingly altered. I want to state, however, that under the action of formol it had shrunk considerably.

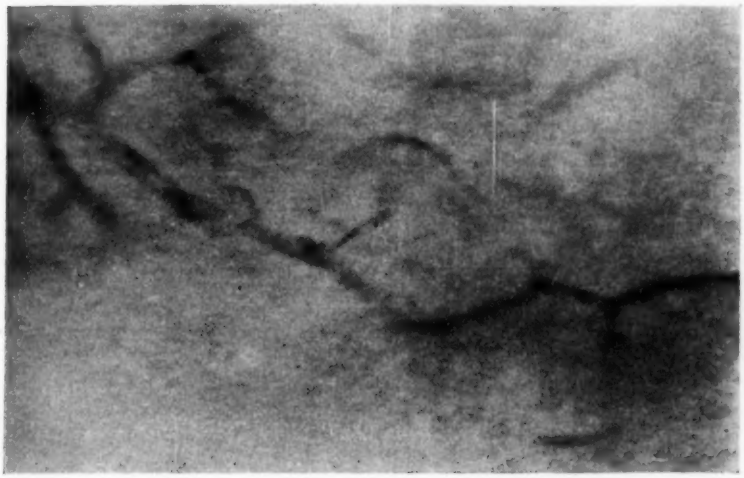

FIG. 3.

When considering the clinical history of the case together with the histological conditions, as found, we may then assume the following to have been the course of the disease: In a hypermetropic eye with a shallow anterior chamber an unknown cause led to thrombosis and thrombo-phlebitis of numerous larger retinal veins; this resulted in stasis and multiple larger and smaller hæmorrhages into the retinal tissue and to pigment atrophy of large areas of smaller blood-vessels from malnutrition. More and more hæmorrhages took place while the older ones underwent fatty degeneration and became partially or totally absorbed, and finally led to several smaller and to a large rupture through the whole thickness of the retina with a considerable effusion of blood into the vitreous body. The blood

being carried by the normal route of the fluids within the eye, through the pupil into the anterior chamber, perhaps, caused the iritis; it also led to a newformation of tissue on the anterior surface of the lower half of the iris, with which the blood remained longest in contact, but it certainly caused the plugging of the filtration tissue in the iris angle. In this manner the intra-ocular pressure became increased and the vicious circle was established leading to the atrophy of the ciliary processes, the pressing forward of the iris periphery and its adhesion to the corneo-scleral tissue, by which in turn a further increase of intra-ocular pressure must necessarily have resulted.

From the conditions found in this case a *restitutio ad integrum* was never to be expected and surgical interference other than enucleation had nothing to hope.

In general, then, our case is very similar to quite a large number as thus far described by others. The fact that retinal hæmorrhages under favorable conditions may secondarily produce glaucoma is and can no longer be doubted. I shall not weary you with a list of the literature, as authors having reported similar cases I will only mention Pagenstecher, Wagenmann, Deutschmann, Weinbaum, Würdemann, De Schweinitz, Schweigger and Lüderitz.

The changes usually found by these authors in the blood-vessels were either confined to endo-arteritis of the retinal arteries with partial or complete closure, or thrombosis and thrombo-phlebitis of the central vein, or, as in our case, multiple thrombosis of the larger retinal veins.

Such and similar pathological changes in the retinal blood-vessels are often seen, retinal hæmorrhages—and even very large ones—are very often observed and yet no glaucomatous symptoms are evoked by them. We see large hæmorrhages into the retinal tissue and into the vitreous being absorbed without causing glaucoma, while in other cases, as seems to be pretty certain, such hæmorrhages are followed by connective tissue formation in the vitreous body (the retinitis proliferans of Manz). Why, then, do such retinal hæmorrhages in some cases produce hæmorrhagic glaucoma? This question naturally arises when considering such cases. Is there anything specific in the hæmorrhage? Certainly not. As far as we know the hæmorrhages as such do not differ from others.

The cause then can only lie in a peculiar previous condition of such eyes when attacked by retinal hæmorrhages.

In my case the hæmorrhages took place in a hypermetropic eye with a shallow anterior chamber. From many specimens examined by me I know it to be a fact and I have, years ago, published it, that in short eyes the insertion of the iris on the anterior part of the ciliary body is much nearer to the ligamentum pectinatum, than it is in long eyes. In consequence the iris angle is much smaller and the anterior chamber more shallow in the short eyes; an obliteration of the iris angle by pressure from behind which forces the iris periphery forward and outward and brings it into contact with the spongy tissue on the inner surface of the cornea, is therefore much more easily brought about in such eyes.

The primary factor, however, I think is always a plugging of the filtration channels, in the cases under consideration due to blood cells which by diapedesis or in consequence of ruptures (by rhexis) are carried into the vitreous and then into the anterior chamber.

True, in some cases we see large hæmorrhages, sometimes even such as fill the whole anterior chamber, gradually disappear without arousing any glaucomatous symptoms. We can only say, that in such cases the channels of filtration were wide enough to take care of the surplus material.

When, however, the filtration channels in the iris-angle are comparatively narrow, when the iris-angle and the anterior chamber are shallow, the surplus matter, and blood-cells more especially, will be caught in the narrow meshes of the filtration tissue, which leads to the clogging of its channels. If this condition lasts long enough, it must start the vicious circle of glaucomatous symptoms. If the hæmorrhages are due to degenerated blood-vessels and in consequence new and repeated hæmorrhages follow the first ones the symptoms must naturally grow graver and graver—till the hope of saving any vision is gone.

DISCUSSION.

DR. TIFFANY.—For one I must thank Dr. Alt for his excellent paper and the fine illustrations. The Doctor spoke of the special pathology of these cases. It seems to me, as he hinted, that the great amount of serum in the globe filling the

vitreous chamber and passing through and interfering with the exit of the fluid brought about this increased tension. It occurred to me, when he was reading the paper, that this case was one of hæmorrhagic retinitis, rather than that it was a true glaucoma. That there were glaucomatous symptoms, but as the Doctor mentions that the eye was hypermetropic two or three dioptres, that would help to account for the increased ocular tension on account of the occlusion and retention of the fluid. While I am on my feet I would like to ask Dr. Alt and the other gentlemen, if it has come to their minds that acute glaucoma is not so frequent now compared with some years ago, that we do not have it so often. When I first went to Kansas City eighteen years ago I used to have quite a number of cases of glaucoma coming to me and now, although my practice is three times as great, I do not see so many. Why this is, I do not know, unless it is that the etiology, the cause is back in a refractive condition of the eye; in other words, that the hypermetropic eye becomes glaucomatous and that in more recent times, during the past fifteen years these cases of hypermetropia have been more frequently corrected by the use of glasses and that this has acted as a prophylactic treatment of glaucoma, a preventive so to speak, so that we do not have these cases of acute glaucoma nearly so frequently as we did in former years.

DR. SUKER.—I was greatly interested in the Doctor's paper and I think it is a valuable contribution to the question, and it was particularly interesting to me because a few years ago I had a chance to watch a case of a similar character that at that time I did not consider a glaucoma, but rather a hæmorrhagic retinitis, in which twice during that time when I was looking at the fundus of the eye I saw little jets of hæmorrhage occur and noted the peculiar way in which the blood percolated inwards into the vitreous. In this case the history was that of a uric acidæmia in which large acid deposits were found in the immense spleen and also in the ciliary body, in the choroid and iris at the post-mortem. During the progress of the case there were repeated attacks of iritis. It was very much like glaucoma, yet the tension in the eye was at no time very much increased and sometimes was rather lower than normal. Sections were not made very carefully, however, of the entire eye so as to get anything like the interesting speci-

mens which the Doctor has given us, but I have often wondered since watching that case and numerous cases of detachment of the retina, or small areas of choroiditis, whether we did not have the gouty iris, the gouty choroid and gouty ciliary body to deal with, and whether many of these conditions were not, if we followed the history, mostly due to uræmic acid in the hypermetropic eye and consequent disturbances of nutrition. In some of the more recent works I have read of the clinical benefits derived from the treatment of gout and particularly of the advantage of the use of iodide of potash, the iodide of mercury and iodide of sodium, which were given to such individuals.

DR. BARCK.—I was more than usually interested in the interesting and very excellent paper of Dr. Alt, in so far as I had to remove one eye for hæmorrhagic glaucoma within the last year. I brought the specimen here as it will illustrate some microscopical points. It seems that von Graefe in the year of 1863 pointed out the connection between hæmorrhages in the retina and secondary glaucoma, and a number of these cases were reported, but the connection between the two conditions, between hæmorrhage and glaucomatous attack, was even then more or less obscure. The explanation as given by Dr. Alt seems to be very plausible, in so far at least, as it refers to cases where there is infiltration of blood into the vitreous. But a number of cases are on record where it is stated that the vitreous has been entirely transparent and where it has been found absolutely transparent after the enucleation. So an explanation of these cases at least is still wanting. There is one point upon which I would like to speak and that is the disc. It is uniformly said by all observers that in those cases of glaucoma there is no excavation of the disc. In a specimen which I have here an excavation of the disc is visible and as far as I have seen from the photographs which were reproduced to-night it is not doubtful as it seems to me that there is a small excavation of the disc.

DR. REYLING.—I have never removed an eye for hæmorrhagic glaucoma, but I have examined five eyes with hæmorrhagic glaucoma and I have found almost everything that Dr. Alt has stated, and they have all had deep cupping every one of them. I did not have any history of the cases except in one case, an eye that Dr. Webster removed on account of se-

vere hæmorrhage. The only way he could stop the hæmorrhage was by removing the eye and I found deep cupping. In the other there was more or less. I had no history of them, but found the same pathological condition.

DR. WHEELOCK.—In 1889 I reported a case of hæmorrhagic retinitis with glaucoma in the *Journal of the American Medical Association.* The first symptom was defective vision, and following that the glaucomatous symptom came on. I did a sclerotomy as a protection against the too sudden relief of the interior pressure. The anterior chamber was slow in forming and as long as the wound remained slightly open the tension did not rise but after ten days it rose again and I did an iridectomy and saved the patient some vision, there was cessation of pain and I preserved the eyeball.

DR. DAYTON.—I agree with Dr. Alt in the matter of the final enucleation of hæmorrhagic glaucoma. However, it is possible sometimes, after informing the patient of the possibility of a failure by iridectomy to attempt it. There is no doubt but that good results have accrued from the operation of iridectomy. Dr. Tiffany spoke of the decrease in the number of cases of glaucoma, and that he has not had any cases recently. He may possibly recollect a patient that he had last summer with hæmorrhagic retinitis, followed by an iritis, which was a sort of migratory case. He left him shortly after calling on him and went to a colleague of his in Kansas City for treatment and some weeks after that presented himself at my office with absolute glaucoma. He gave me a history of the case saying, that Dr. Tiffany had diagnosed a hæmorrhagic retinitis, or as he expressed it, a hæmorrhage into the tissue of the eyeball, and that he had also had iritis, which the Doctor had treated for a while. Finally, for some reason, he went to another ophthalmologist, who gave him atropine to carry away with him and continue to use it, how long I am not sure but when he presented himself at my office there was an absolute glaucoma. Thinking, of course, that it was of the hæmorrhagic variety, I told him of the ordinary operation that frequently relieved the pain—he was suffering at that time a great deal of pain, and had not slept for many weeks, as he expressed it. I told him that the probabilities were that an iridectomy would do him no good, and that I thought the eyeball would have to be removed. However, I gave him a solution of eserine and

he used it very vigorously; he came back the next day and said he had a comparatively easy night. So I told him to continue the use of the eserine and he did so for a few days and finally transformed his affections to Dr. Gifford, of Omaha. Dr. Gifford did an iridectomy and wrote to me of the case saying that he probably would have to remove the eyeball, and a brother of his who resides in Lincoln, told me that the operation of enucleation had been done on a certain day. The result of the iridectomy I presume is good when there is no further hæmorrhage or rupture of the retinal vessels. In those cases where it is localized and where there is not an extensive rupture and the vessels are of a character to withstand the strain, iridectomy will undoubtedly be of service; but those cases, according to my opinion, are very few, and before operating by iridectomy—I am speaking of cases of hæmorrhagic glaucoma—I would always inform the patient of the possibility that a future enucleation may be necessary for the relief of pain.

DR. BULSON.—Speaking of hæmorrhagic retinitis being a precursor or hæmorrhagic glaucoma this recalls to me an interesting case, in which a lady presented herself with glaucoma, stating that several weeks before, while lifting, she had suddenly become blind. At the time that she paid her visit to my office she had a notable increase in tension and vision was *nil.* However, pain had not come on for some weeks subsequent to the development of the loss of vision. I informed the patient of the possibility of relief from iridectomy, performed the iridectomy without result and enucleated the eyeball. To me the case was of particular interest in view of the case which Dr. Alt has reported.

DR. TIFFANY.—I would like to say that I did not quite mean to state that I never have cases of glaucoma now; I did not mean to say that or to convey that idea, but what I do say and did say is, that I do not think they occur so often as they did formerly—acute cases. And I think these cases that we are speaking of now are not glaucoma but something else before the glaucomatous symptoms appear, and that is the reason we do not get any good results from iridectomy—in those cases we have retinitis hæmorrhagica and following that we have glaucomatous symptoms. But it is not glaucoma. If Dr. Reyling has a cupped disc in his cases those are glaucomatous

cases, those are not cases of retinitis hæmorrhagica. In the case presented this evening I did not notice a cupping of the surface. It was not a cupped disc.

DR. ALT.—Oh, yes, it was certainly but slightly cupped, more on one side than on the other.

DR. TIFFANY.—It appeared to me rather convex—part of it.

DR. ALT.—One part looked convex because the other was concave.

DR. TIFFANY.—In the cases that I have seen there was a decided cupping and the blood-vessels went out from the edge; of course that was not the case here.

DR. ALT.—I just want to answer Dr. Tiffany. Of course, in the photographs that I showed, the cupping is not so apparent in the high power photographs on account of the small portions of the disc shown, but there was a decided cupping. As I said, the cupping was rather small, but the lamina cribrosa was convex backwards. I also wish to recall to the Doctor, that I have not once in the whole paper, except in the title, spoken of hæmorrhagic glaucoma, but have referred to it always as a typical case of retinal hæmorrhage inducing secondarily glaucoma and that was the very standpoint which I wanted to take in this paper, and I am sorry if it did not come out. I do believe that hæmorrhagic glaucoma is nothing but a secondary disease induced by the hæmorrhages and not, as the Doctor misunderstood me, by the *serum* which is infiltrated into the vitreous body and carried into the anterior chamber but to the clogging of the filtration angle by the corpuscular elements of the blood, the blood cells. In order that this may happen it is not necessary at all that blood be found microscopically in the vitreous body or at least in large quantities. Not only blood cells but other cells can often be found in the iris angle by careful research, and I have found pigment cells there so often that I think it is a normal process; they are shed in the posterior part of the eye, from the choroid particularly, and are carried continually out with the stream of the fluids into the iris-angle, and away from there, and no not, in the usual run of things, cause glaucoma. In this connection I will say that I have a specimen, and am sorry I did not bring it, where there is gathered an enormous quantity of such cells in the iris-angle; it is just gorged with them and yet no glaucoma was induced,

because there was sufficient space to let the fluids pass through in spite of these cellular elements. With regard to the gouty diathesis, I agree with Dr. Colburn, and I had given this woman a milk diet, with lithia water, and iodide of sodium, as soon as she came. Ever since Dr. Ch. S. Bull published some very excellent observations some years ago on the frequency of eye troubles resulting from the gouty diathesis, I have always paid particular attention to it. But whether gout was the cause of the degeneration of the blood-vessels that I found in this eye and particularly of the pigment degeneration of the walls of the smaller blood-vessels and of the retinal capillaries, I do not know. It is the first time I have seen this condition myself. This is not the only case of hæmorrhagic glaucoma I have examined histologically; I have examined four other specimens; but this is the one I have examined most carefully and which I have had occasion to see clinically from the beginning to the end. Therefore I took this case for my paper.

BOOKS AND PAMPHLETS.

RETINOSCOPY (OR SHADOW TEST) IN THE DETERMINATION OF REFRACTION AT ONE METER DISTANCE, WITH THE PLANE MIRROR. By JAMES THORINGTON, M.D., Adjunct Professor of Diseases of the Eye in the Philadelphia Polyclinic and College for Graduates in Medicine. Twenty-four illustrations. Price, $1.00. Philadelphia: P. Blakiston, Son & Co.

While the shadow test is regarded, by those who have carefully studied it, as the quickest and most reliable objective method of estimating errors of refraction, it is still not as universally used as it deserves to be. This may be explained possibly on the ground that the description of the method found in most text-books is not at all clear, and the beginner after making a few perfunctory trials gives up in disgust. We therefore welcome Dr. Thorington's practical little manual—an abstract of lectures on Retinoscopy delivered before the students at the Philadelphia polyclinic. The author gives in a concise way and with as few technicalities as possible the

essential facts which will enable any one to easily acquire a working knowledge of the subject.

Confusion is avoided by limiting the description to the method most generally adopted, *i. e.*, the plane mirror at one meter distance.

The text is profusely illustrated and the press work good. This is a first-rate manual for students and will no doubt assist in making a host of new advocates for Retinoscopy.

J. E. J.

PAMPHLETS.

"Can Tuberculosis be Diagnosed From the blood" By C. Fisch, M.D.

"Twenty-Eighth Annual Report of the Brooklyn Eye and Ear Hospital."

"Mouth-Breathing Caused by Adenoids, and Its Relief." By H. W. Loeb, M.D.

"Eighth Annual Report of the New Amsterdam Eye and Ear Hospital, New York"

"Binasal Hemianopsia, With the Report of an Additional Case." By C. S. Veasey, M.D.

"The Influence of Deafness Upon the Development of the Child." By H. A. Alderton, M.D.

"An Ophthalmoscopic Study of a Case of Hæmorrhagic Neuro-Retinitis." By Ch. A. Oliver, M.D.

"The Commitment of the Insane and the Insanity Law of the State of New York." By W. Jacoby, M.D.

"Einiges zur Lehre von der Enstehung und dem Verlaufe des Prodromalen und Acuten Glaukomaufalles." (Some Remarks Concerning the Origin and Course of the Prodromal and Acute Glaucomatous Attack). By W. Czermak, M.D.

Dr. Louis A. Lebeau, of this city, died Sunday morning, April 11, at the age of forty-eight years. He was for many years Assistant to the Chair of Ophthalmology at the St. Louis Post-Graduate School and the Missouri Medical College.